

trees were blown down. A barn was struck by lightning at Harvey, Wis. One person was killed by lightning at Parkston, S. Dak. Buildings were damaged during a severe thunderstorm at Clermont, Iowa.

**25th.**—A barn was struck by lightning near Quaker Street, N. Y. A heavy thunderstorm, with hail, occurred at Port Richmond, Pa. A thunderstorm caused some damage about Philadelphia, Pa. A thunderstorm, with high wind and heavy rain, occurred at Beverly, N. J. Heavy rain, attending a thunderstorm in the evening, caused great damage about Ella, W. Va. Lightning and high wind in the afternoon damaged property at Parkersburg, W. Va.; a large barn was struck by lightning and burned; loss about \$6,000. A heavy thunder and rain storm occurred at Livingston, Ala., from 7.30 to 8 p. m.; 1.28 inch of rain fell; a house was struck, and a number of persons were shocked by lightning. At Greenville, Miss., a church was struck by lightning. Some stock was killed and a man was stunned by lightning at Covington, Tenn. A child was killed by lightning at Paducah, Ky. A barn was struck by lightning at Alpena, Mich. A house was struck by lightning at Plover, Wis. Grain was destroyed by hail about Algona, Iowa.

**26th.**—In the early morning 3 barns at Berlin and one barn at Williams, Vt., were struck by lightning and burned. A thunderstorm, with violent gusts of wind, occurred at Ithaca, N. Y., in the early morning; a hotel was struck by lightning. A thunderstorm, with heavy hail, caused damage to the extent of about \$10,000 about Pine Grove, Pa. One person was killed by lightning at Philipsburg, Pa. A horse was killed by lightning at Stanardsville, Va. The roof of the Weather Bureau office building at Tampa, Fla., was struck by lightning in the evening. Lightning struck in several places about Thornville, Mich.; one barn was struck by lightning and burned. A severe thunderstorm prevailed at night at Barron, Wis.; a man was killed by lightning near Barron and a house was struck by lightning at Dallas, Wis. Heavy rain at Minneapolis, Minn., flooded sewers and interrupted street traffic. In Saint Paul, Minn., the damage from heavy rain was estimated at \$250,000. The railroad depot at Eggleston, Minn., was struck by lightning and burned. A heavy wind and rain storm passed over Flandreau, S. Dak.; 1.00 inch of rain fell in 25 minutes, and crops were damaged. A house was struck by lightning at Amarillo, Tex.

**27th.**—A thunderstorm from the west visited Hess Road Station, N. Y., at 3.45 p. m.; 5 houses were struck by lightning; buildings were injured, and a large number of trees were destroyed by high wind; 2.10 inches of rain fell, and crops in a path about 1 mile in width were flattened. A violent storm struck York, Pa., at 1.22 p. m. and ended 1.50 p. m.; one person was killed by lightning, and considerable damage was caused by high wind. During a thunderstorm at Lebanon, Pa., a mill was wrecked by wind. High wind caused damage at East Earl, Pa. Damage to the extent of \$3,000 to \$4,000 was caused by a thunderstorm at Terre Hill, Pa. Damage of a minor character was reported at Columbus, N. J. A thunderstorm, with light hail, occurred at Stony Man, Va. At Luray, Va., one person was killed by lightning during a thunder and hail storm. Two persons were killed, and 3 barns were struck by lightning at Culpeper, Va.

Damage was caused at Milton, W. Va., by a thunderstorm. During a thunderstorm in the afternoon at Parkersburg, W. Va., a number of persons were shocked, and 40 telephone wires were burned out by lightning. At Toledo, Ohio, a

thunderstorm from the west began 1 p. m. and ended 2.30 p. m.; the temperature fell from 91° to 68°; and a house was struck by lightning. Buildings were damaged during a thunderstorm at Massillon, Ohio. Three houses were struck by lightning at Portsmouth, Ohio. Buildings were unroofed at Wooster, Ohio. Lightning struck in three places at Wauseon, Ohio. Severe storms occurred in Lower Michigan in the early afternoon. At Detroit, Mich., lightning struck in two places, and the temperature fell from 91° to 68° in about 5 minutes. A house was struck by lightning at Windsor, Ont. At Alpena, Mich., a thunderstorm occurred in the early morning, and a second thunderstorm prevailed from 8.10 to 10.50 a. m.; a large number of telephone wires were burned out. A man and a horse were killed by lightning at Green Bay, Wis. During a thunderstorm in the evening at La Crosse, Wis., a church spire and several trees were struck by lightning; damage by lightning was also reported in the surrounding country.

A heavy thunder and wind storm occurred at Larrabee, Iowa; a house was struck by lightning. A child was struck by lightning and killed near Concord, Iowa. At Sioux City, Iowa, a heavy thunderstorm from the south began 4 p. m.; heavy rain began 4.30 p. m., 1.40 inch falling in 1 hour; the temperature fell from 99° to 65°; considerable damage was caused by high wind and heavy rain, and lightning struck in several places. At Red Wing, Minn., a thunder and rain storm occurred in the early morning; a house was struck by lightning. A second storm occurred in the evening, during which the wind reached 36 miles per hour; damage was caused by wind, and trains were delayed by washouts. A northeast gale, with maximum wind velocity 60 miles per hour, occurred at Winnemucca, Nev., in the evening.

**28th.**—During a thunderstorm in the evening at New Haven, Conn., a house was struck by lightning and damaged to the extent of \$3,500. A thunderstorm, with heavy rain, occurred at Lynchburg, Va., in the afternoon; 2.00 inches of rain fell in 9 hours; the temperature fell from 96° to 68°; and hail fell south and southwest of Lynchburg. Crops about Springdale, Tenn., were injured by a thunder and wind storm. A wind squall damaged trees, etc., in northwest part of Indianapolis, Ind. Telephone wires were burned out during a thunderstorm at Alpena, Mich.

**29th.**—Several barns were struck by lightning and burned at Burlington, Vt. At Pittsburg, Pa., thunderstorms occurred at intervals during the afternoon; in the suburb of Highland Park 3 persons were killed and 4 were seriously injured, and much loss to property was reported. Four barns were struck by lightning at Edinboro, Pa. A house was struck by lightning at State College, Pa. Damage was caused by a thunderstorm at Harrisonburg, Va. At Portsmouth, Ohio, a house was struck and several persons were shocked by lightning.

**30th.**—A hailstorm occurred in the evening at Wahpeton, N. Dak.; glass was broken and wheat destroyed. A thunderstorm was reported at Oberlin, Kans.

**31st.**—A schooner was struck by lightning at Solomons, Md. Corn and cotton were damaged by hail south of Augusta, Ga. High wind caused damage about Poulan, Ga. A thunderstorm, with high wind and heavy rain, damaged crops, etc., about La Crosse, Wis. At Sparta, Wis., a heavy windstorm, with thunder, lightning, and small hail, was reported; a church steeple was struck, and one person was severely injured by lightning. A thunderstorm passed north of Dubuque, Iowa, between 5 and 6 p. m.; heavy rain flooded streets and damaged crops.

## INLAND NAVIGATION.

### FLOODS.

The month opened with rivers above the danger-line as follows: At La Crosse, Wis., 0.6 foot; Dubuque, Iowa, 0.4 foot; Davenport, Iowa, 1.7 foot; Keokuk, Iowa, 5.0 foot; Hannibal,

Mo., 3.8 feet; Helena, Ark., 1.0 foot; Arkansas City, Ark., 3.5 feet; Vicksburg, Miss., 5.4 feet, and New Orleans, La., 3.1 feet. On the 3d the Mississippi River fell below the danger-line at Dubuque, Iowa. On the 4th the river rose above

the danger-line at Saint Louis, Mo., and rose slowly at that point until the 8-9th, when it was 1.1 foot above the danger-line. On the 6th the Mississippi River fell below the danger-line at La Crosse, Wis., Davenport, Iowa, and Arkansas City, Ark. Floods were reported in streams in western Illinois. Tracks of the Illinois Central Railroad were flooded near New Orleans, La.

On the 9th water from Lake Pontchartrain flooded the rear portion of New Orleans. On the 10th the Warrior River in Alabama was rising rapidly. On the 10th and 11th damage was caused by flood along the Warrior and Tombigbee rivers. On the 12th the Mississippi River fell below the danger-line at Hannibal, Mo. Great damage was caused about Columbus, Miss., by high water in the Tombigbee River. On the 13th the Mississippi River fell below the danger-line at Keokuk, Iowa. Low lands about Nebraska City, Nebr., were flooded by a rise in the Missouri River. Floods continued along the Warrior and Tombigbee rivers, causing great destitution, and immense damage to the corn and cotton crops.

On the 15th the Mississippi River fell below the danger-line at Saint Louis, Mo. The Coosa River overflowed its banks at Gadsden, Ala., and the Alabama River was rising rapidly. On the 20th the Pearl River was reported the highest ever known at Jackson, Miss.; great loss of stock and crops was reported in swamp lands. On the 24th the Mississippi River fell below the danger-line at Helena, Ark., and Vicksburg, Miss. At the close of the month the rivers were below the danger-line, except at New Orleans, La., where it continued above the danger-line until August 4th.

#### STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, July, 1892 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>						
Shreveport, La. ....	29.9	21.6	1	6.0	31	15.6
<i>Arkansas River.</i>						
Fort Smith, Ark. ....	22.0	8.1	7	3.0	31	5.1
Little Rock, Ark. ....	23.0	11.5	10	8.5	28	3.0
<i>Missouri River.</i>						
Fort Buford, N. Dak. ....		18.8	5	11.3	31	7.5
Bismarck, N. Dak. ....		14.7	7	6.8	31	7.9
Pierre, S. Dak. ....	14.0	9.3	9	3.9	31	5.4
Sioux City, Iowa. ....	18.7	15.9	12	11.1	31	4.8
Omaha, Nebr. ....	18.0	15.3	3, 14	11.1	31	4.2
Kansas City, Mo. ....	21.0	19.8	5	14.0	31	5.8
<i>Mississippi River.</i>						
Saint Paul, Minn. ....	14.0	8.4	1	4.5	17, 18	3.9
La Crosse, Wis. ....	11.8	10.6	1, 3	5.1	26	5.5
Dubuque, Iowa. ....	16.0	16.4	1	6.7	31	9.7
Davenport, Iowa. ....	15.0	16.7	1	5.4	28-31	11.3
Keokuk, Iowa. ....	14.0	19.0	1	6.3	31	12.7
Hannibal, Mo. ....	17.0	20.8	3	8.0	31	12.8
Saint Louis, Mo. ....	30.0	31.1	8, 9	19.0	31	12.1
Cairo, Ill. ....	40.0	36.2	13, 14	21.3	31	14.9
Memphis, Tenn. ....	33.0	28.8	17	18.5	31	10.3
Vicksburg, Miss. ....	41.0	46.4	1	37.7	31	8.7
New Orleans, La. ....	13.0	16.1	1	13.5	31	2.6
<i>Ohio River.</i>						
Parkersburg, W. Va. ....	38.0	9.9	7	4.3	23, 28	5.6
Cincinnati, Ohio. ....	45.0	15.2	8	8.0	29, 30	7.2
Louisville, Ky. ....	24.0	7.7	7	4.9	31	2.8
<i>Cumberland River.</i>						
Nashville, Tenn. ....	40.0	7.1	12	2.7	31	4.4
<i>Tennessee River.</i>						
Chattanooga, Tenn. ....	33.0	12.4	7	3.8	31	8.6
<i>Monongahela River.</i>						
Pittsburg, Pa. ....	29.0	7.8	6	2.7	11	5.1
<i>Savannah River.</i>						
Augusta, Ga. ....	32.0	24.7	12	7.7	31	17.0
<i>Willamette River.</i>						
Portland, Oregon. ....	15.0	18.5	4	8.5	31	10.0
<i>Susquehanna River.</i>						
Harrisburg, Pa. ....	17.0	4.7	1	1.4	30	3.3
<i>Alabama River.</i>						
Montgomery, Ala. ....	48.0	20.4	16	2.8	6	17.6

## ATMOSPHERIC ELECTRICITY.

### THUNDERSTORMS.

Description of the more severe thunderstorms reported for the month is given under "Local storms."

Thunderstorms were reported as follows: East of the Rocky Mountains they were reported in the greatest number of states, 34, on the 22d; in 33 on the 13th and 26th; in 32 on the 25th and 29th; in 31 on the 3d and 27th; in 20 to 30 on the 1st, 2d, 9th to 12th, 14th, 15th, 16th, 18th to 21st, 23d, 24th, 28th, 30th, and 31st; and in 10 to 19 on the 4th to 8th, and 17th.

East of the Rocky Mountains thunderstorms were reported on the greatest number of dates, 31, in Florida and Mississippi; on 20 to 30 in Alabama, Arkansas, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Michigan, Missouri, Nebraska, New York, North Carolina, North Dakota, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, and Wisconsin; on 10 to 19 in Colorado, Indiana, Maine, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, Ohio, Rhode Island, and Vermont; and on 9 in the District of Columbia and Indian Territory.

West of the Rocky Mountains thunderstorms were reported in Arizona on the 1st to 6th, 9th to 26th, 30th, and 31st; in California on the 3d, 4th, 5th, 26th, and 27th; in Colorado on the 1st, 6th to 19th, and 21st to 30th; in Idaho on the 28th; in Nevada on the 4th, 5th, 7th to 10th, 12th, 13th, 27th, and 28th; in New Mexico on the 1st, 4th to 18th, and 20th to 31st; in Utah on the 5th to 10th, 16th, 19th, and 27th to 31st; in Washington on the 3d, 4th, 6th, 11th, 14th, 15th, 19th, and 22d; and in Wyoming on the 1st, 2d, 3d, 6th to 9th, 21st, 27th, 28th, and 29th.

### AURORAS.

Exceptionally brilliant auroral displays over unusually ex-

tensive areas of visibility, for the season, were a feature of the month, the display of the night of the 16th, which was observed from Maine to Montana, and southward to North Carolina and Missouri, being one of the most remarkable ever noted during the summer months.

#### Auroral displays of July, 1892.

Date.	Station.	Extent of display.		Remarks.
		Azimuth.	Altitude.	
13-14	Buffalo, N. Y. ....	115 to 255	0	25 Arch of diffused white, with flashes of light to zenith.
13	Oswego, N. Y. ....	.....	40	Arch, with "merry dancers."
13	Chicago, Ill. ....	Cov'd 160	40	Diffused white light.
13-14	Alpena, Mich. ....	.....	.....	Arch of white light, with beams nearly to zenith.
13-14	Cheboygan, Mich. ....	135 to 215	45	Arch and brilliant streamers of purple and orange to zenith.
13	Detroit, Mich. ....	.....	70	Bright white arch formed, with streamers to zenith.
13	Grand Haven, Mich. ....	.....	15	Arch of white light, with "merry dancers" to zenith.
13	Marquette, Mich. ....	90 to 270	Zenith	In morning, wavy vertical folds of flashing light.
13	Marquette, Mich. ....	135 to 225	30	At night, irregular arch, with streamers.
13	Sault Ste. Marie, Mich. ....	180 to 270	30	Yellow and bluish light, with streamers.
13	La Crosse, Wis. ....	In north.	45	Arch of white light, with "merry dancers."
13	Milwaukee, Wis. ....	.....	.....	Bands, curtains, and streamers to zenith, with rapid movement from southeast to northwest.
13	Des Moines, Iowa. ....	Cov'd 45	15	Pale gray diffused light, with one streamer in northwest.
13	Hannibal, Mo. ....	90 to 270	90	Arch of white light, with beams in north.
13	Yankton, S. Dak. ....	140 to 230	20	Two arches, with light moving from west to east.
13	Miles City, Mont. ....	.....	75	Column of rose color in southeast, moved slowly to northwest, and there formed an arch.
14	Spokane, Wash. ....	.....	20	Faint arch, with vertical beams in early morning.